

AFRL

THE AIR FORCE RESEARCH LABORATORY
LEAD | DISCOVER | DEVELOP | DELIVER



Community Leaders Forum



Mr. Douglas Bowers
Air Force Research
Laboratory



AFRL Video





Outline



- **AFRL Overview**
- **BRAC**
- **WPAFB Initiatives**



AFRL Mission



■ **Leading the discovery, development, and integration of affordable warfighting technologies for our air and space force.**

**It's not just about the science...
...it's about leadership in S&T**



AFRL People & Facilities



- **5,764 Government Employees**
 - 4570 Air force Civilian
 - 1194 Military
- **3,844 Onsite Contractors**



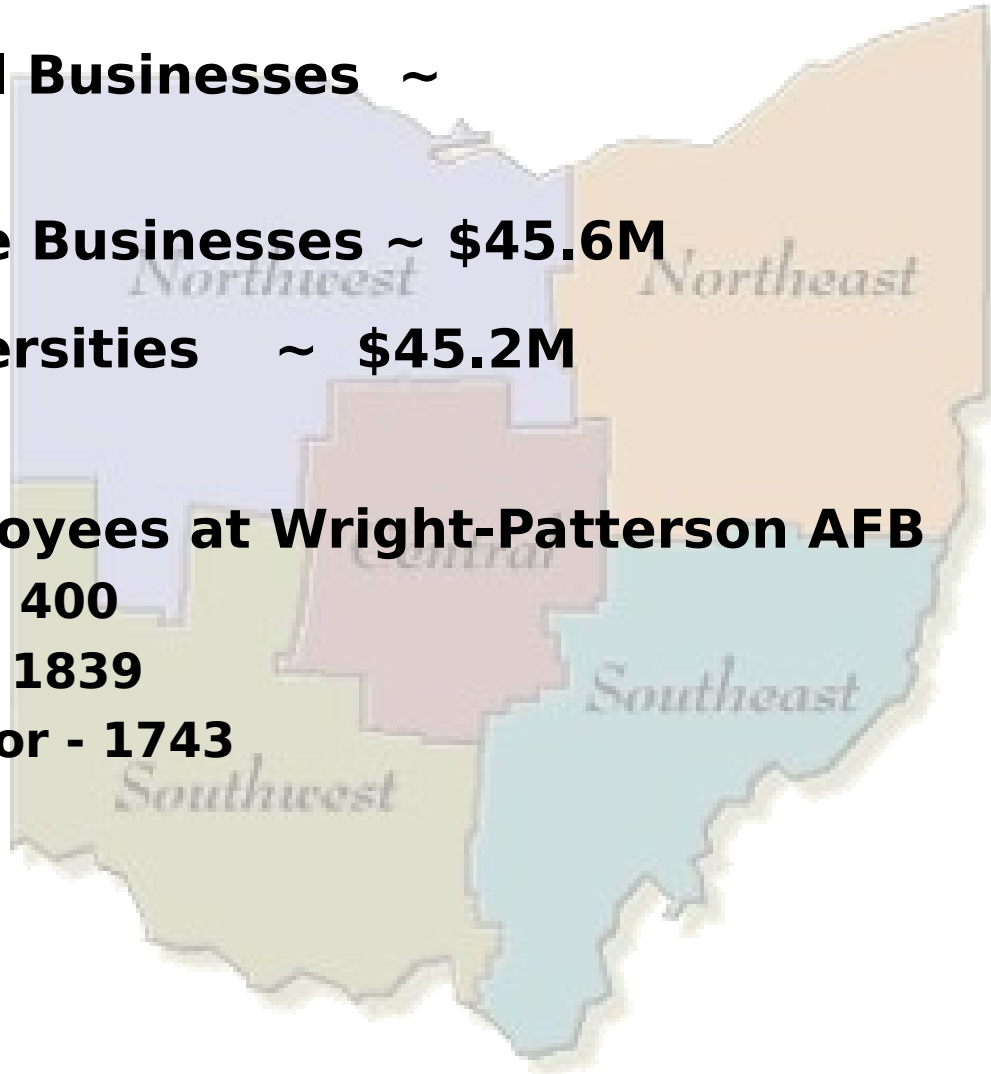
- **10 Major R&D Sites across US**
- **40 Sites World-Wide**
- **\$40B Real Property & Capital throughout AFRL**



The Ohio Connection



- **Ohio Small Businesses ~ \$101.5M**
- **Ohio Large Businesses ~ \$45.6M**
- **Ohio Universities ~ \$45.2M**
- **AFRL Employees at Wright-Patterson AFB**
 - **Military - 400**
 - **Civilian - 1839**
 - **Contractor - 1743**





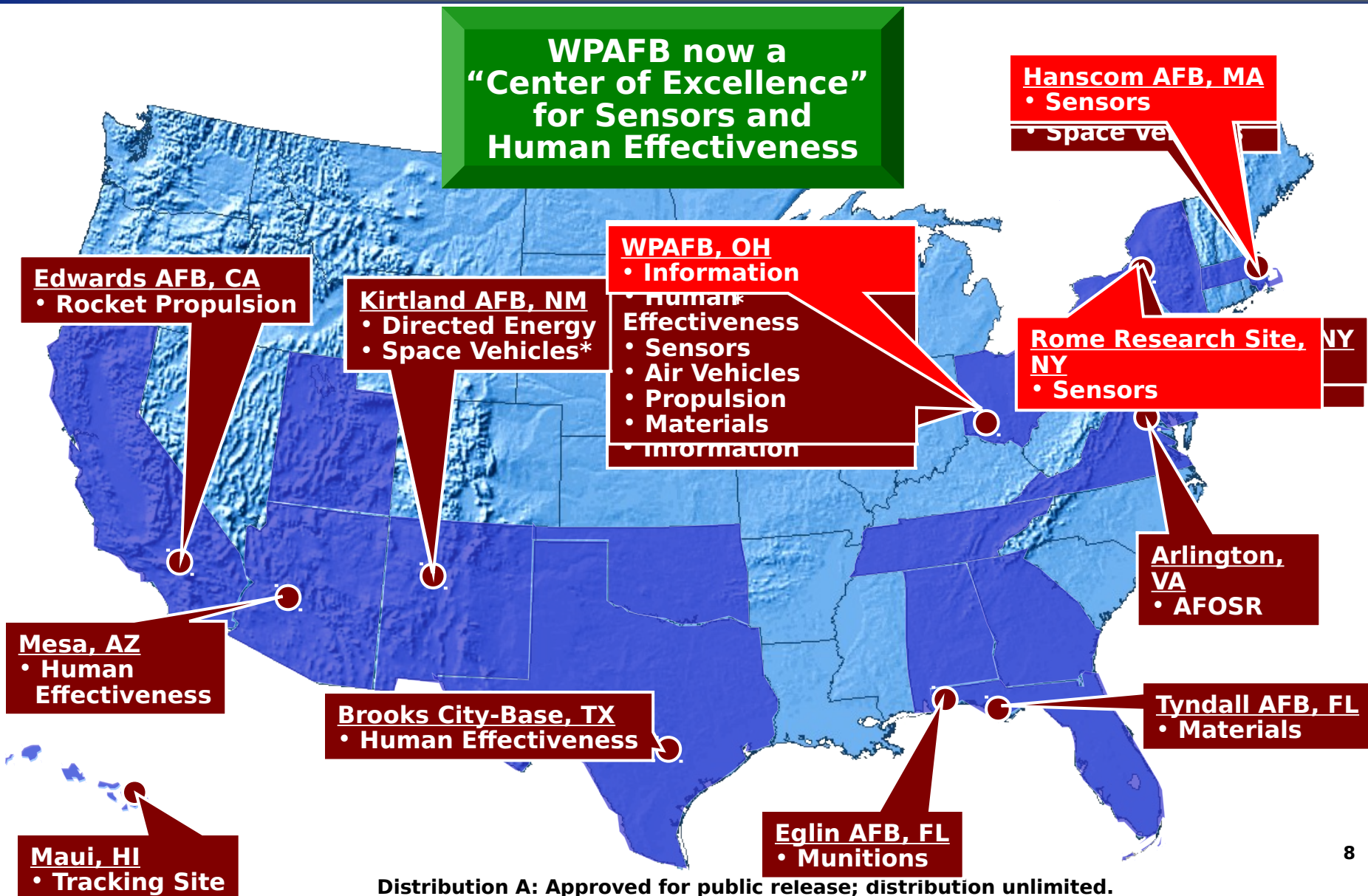
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BRAC Consolidation - AFRL





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AFRL Customer and Timeline



SECAF, Chief - long view, strategic planning



Program Managers - next generation, acquisition & sustainment



Warfighter (e.g. AFSOC, USSOCOM) - today, employing capabilities

2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026

rapidly deliver technical innovation, driven by warfighter emergencies - reshape today's battles

develop technology options that meet the needs of capability developers - deliver on our commitments

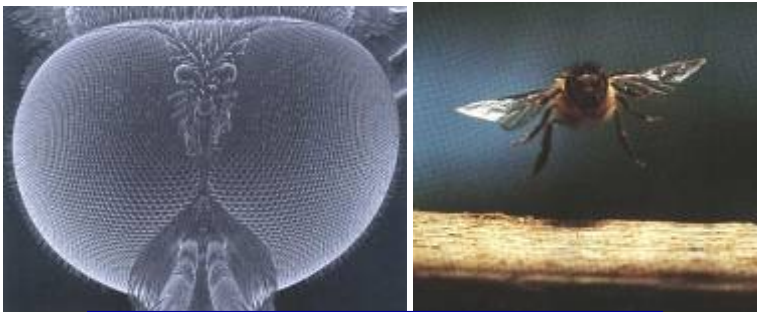
conduct long-term research, driven by a bold technology goal - shape the future



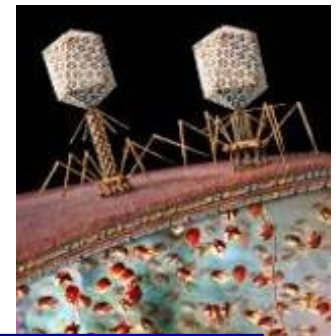
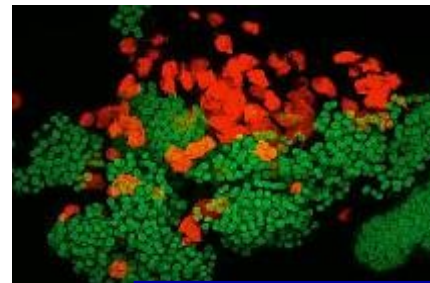
eXploiting **B**iology for continued Air Force dominance

Bio-X STT => focusing revolutionary biological research in AFRL on Air Force problems

- **Basic concepts are biologically motivated**
- **Applications can be biomimetic (based on bioinspired mathematical and engineering principles) or biotechnology (use of biocomponents in solution space)**



Guidance & Control



Taggants



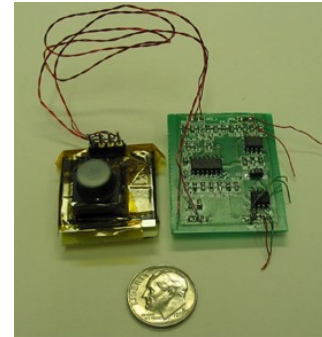
AFRL Biomimetic Thermosensor



From basic research to a functional IR imager

Approach: Identify thermosensitive proteins and incorporate them into electrically conductive polymer films to create hybrid sensing devices.

Accomplishments: Ultra-lightweight, highly sensitive and incredibly fast thermal detectors which do not rely on cryogenic temperatures are now a reality.



Applications:

- Low-cost and lightweight thermal sensors
- IR for individual warfighters
- IR for UAVs and space systems
- New seeker systems



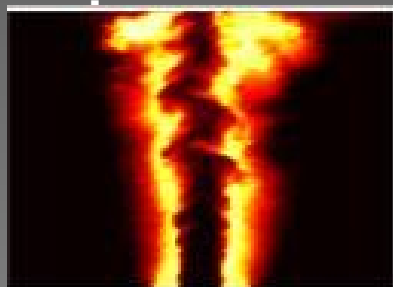


Fuel Initiatives

Current Investment Areas

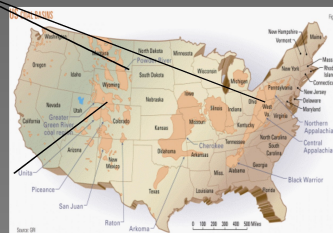
Alternative fuels

- Currently a small but critical effort in Fischer-Tropsch fuels
- SECAF request: Demonstration of F-T fuel in manned Air Force aircraft this summer
- AFMC is lead organization
 - AFRL is lead for technical guidance
- AFMC defining next steps after



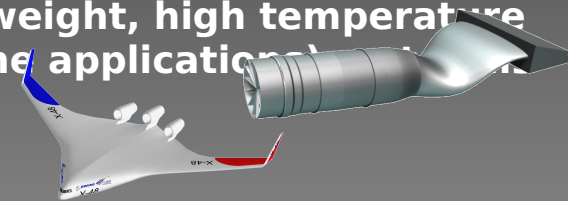
coal

shale



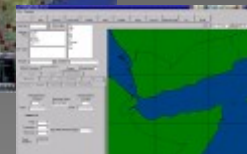
Platform fuel efficiency

- Lightweight, efficient aero structures
- Advanced, fuel efficient turbine engine technology
- Lightweight, high temperature engine applications



Conservation

- Improved simulator technology
- Improved mission/route planning





Automated Air Refueling



■ Unmanned Aerial Vehicles

- Extends Range
- Shortens Response for Time-Critical Targets
- Maintains In-Theater Presence Using Fewer Assets
- Deployment with Manned Fighters and Attack Without the Need of Forward Staging Areas



■ Manned Aircraft

- Provides Adverse Weather Operations
- Improves Fueling Efficiency
- Reduces Pilot Workload



AAR Will Assist UAVs in Reaching Their Full Potential and Greatly Enhance Manned Refueling

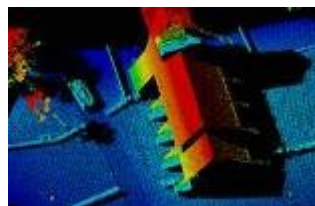


QUICK REACTION SUPPORT: Near Term Partial Brownout Solution

'See-and-Remember' Integrated Concept



Digital high resolution image/video (LADAR or visible) of landing area taken prior to brownout conditions



Zoom/pan/tilt of image to correspond to aircraft position relative to ground during brownout with low speed symbology overlays



Cockpit Display, Laptop, HUD, or Helmet Mounted Display



Desired landing zone identified

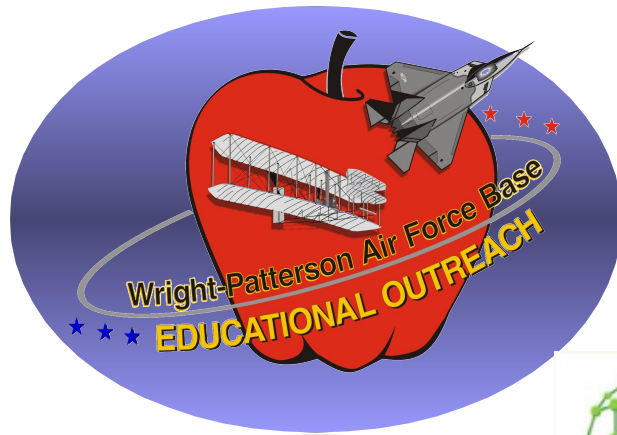
IMU/INS/GPS Inertial Data used to determine aircraft position & attitude



Landing using propagated imagery and flight instruments



Educational Outreach



First LEGO League 2006



Every September a new FLL challenge is announced, and teams of up to 10 students, ages 9 - 14, design, build and program a fully autonomous robot to solve a series of tasks on a 4 x 8 foot playing field where teams compete for the highest score.



Second Year Complete!! Success



-Over 2000
Students, 50
Classes

-All Fairborn and
Mad River 5th
Graders will be
participating



- 1724 Demos
-Over 41,225
students to date
-Over 45 schools
-10 school districts



Summary



- Long-term research, driven by a bold technology vision - **shape the future Air Force**
- Technology options that meet the needs of capability developers - **deliver on our commitments**
- Technology response to urgent needs - **provide rapid solutions with unprecedented innovation**



QUESTIONS?

www.afrl.af.mil